tions have been reached which formerly were impossible to attain. The data collected at various heights above the earth's surface have now, therefore, become considerable, and our knowledge of the distribution of atmospheric temperature has in this way been greatly advanced. Thus it is known that the temperature does not gradually decrease as greater elevations are reached at the rate that was previously assumed. In fact, numerous records from automatic instruments have shown that at some heights quite considerable rises in temperature, extending through large depths of atmosphere, have been noted, these inversions being far more common than was at first contemplated.

With this condition of things so prominently brought out, it is at once obvious that some attention should be paid to a possible revision of the assumption on which the theory of astronomical refraction is based, because the path of a ray of light traversing such variously heated layers may not be the same as that computed on the old hypothesis.

Fortunately this question is now receiving some attention, and this is shown by a recent preliminary paper by Prof. H. G. van de Sande Bakhuyzen entitled "On the Astronomical Refractions Corresponding to a Distribution of the Temperature derived from Balloon Ascents," which appeared in the *Koninklijke Akademie van Wetenschappen te Amsterdam* (January 26).

In this investigation Prof. Bakhuyzen has employed observations made on 182 different days, of which fifty-eight were made with unclouded and 124 with clouded sky. The ascents were made from Halde (in Denmark), Berlin, Paris, Strassburg, and Vienna, so that the values which he gives for temperatures at heights from 0 kilometre to 16 kilometres apply to the mean of the area enclosed by those stations. The values for the means above 13 kilometres are, as he states, not very certain, but the observations indicate that the temperature at these heights decreases slowly.

As this table is of considerable interest, a portion of it may be given here:—

Temperatures (centigrade) at heights from 0–16 kilometres for clear weather.

Height	Annual mean	Diff.
0	+ 6·4	- 1·1
1	+ 5·3	- 4·3
2	+ 1·0	- 4·8
3	- 3·8	- 5·5
4	- 9·3	- 6·1
5	- 15·4	- 6·4
6	- 21·8	- 6·7
7	- 28·5	- 7·3
8	- 35·8	- 7·4
9	- 43·2	- 6·4
10	- 49·6	- 5·1
11	- 54·7	- 2·3
12	- 57·0	- 1·0
13	- 58·0	- 0·6
14	- 58·6	- 0·4
15	- 59·0	- 0·2
16	- 59·2	

The result of this preliminary investigation shows that when the refractions for zenith distances greater than 85° have been determined, the values for these alone are given in the paper, the values deviate perceptibly from those deduced from Ivory's theory.

Even if great weight be not put on this result, the inquiry is one which should undoubtedly be taken up again when more data are forthcoming. The astronomer of to-day is perhaps inclined to look upon the results of the computation of refraction by methods at present in use as strictly correct, but evidently due regard must now be paid to new data rendered available by atmospheric soundings. The subject of Prof. Bakhuyzen's inquiry is therefore of considerable importance, and future research in this direction will be followed with interest.

NOTES.

In the issue of the *Revue Scientifique* for March 30 are re-printed portions of the funeral oration delivered by M. Briand, the Minister of Public Instruction, at the national funeral of M. and Mme. Berthelot at the Panthéon on March 25. M. Briand, speaking of Berthelot, said:—"The illustrious man of science, the great Frenchman for whom we mourn, was one of those colossal men who are an honour to every country and every age. He thought it the duty of every citizen to interest himself in the affairs of his city, and that is why his life was so multiplex, why his activities were exercised in such various directions. Probably he would have preferred to give all his time to his laboratory and his favourite studies; but when the public interest called him, when it looked to him to place his science at the service of the national defences of education, of general politics, Marcellin Berthelot did his duty simply, and we have thus to celebrate to-day at the same time the man of science, the philosopher, the educator, the politician and *l'honnête homme*." Toward the close of his oration M. Briand remarked that he had been called by his position "to the painful and formidable honour of rendering homage, in the name of the Government, to the man of genius for whom universal science is in mourning"; he then proceeded to give a touching eulogy of Berthelot as a private individual. The discourse serves admirably to show the high esteem in which the French people and rulers hold their great men of science.

Dr. Nansen will give a paper on "Polar Problems" at the Royal Geographical Society on Monday, April 29; on May 13 a paper on "An Expedition from the Niger to the Nile" will be read by Lieut. Boyd Alexander.

At the recent annual meeting of the Royal Irish Academy Prof. F. A. Tarleton was elected president for the session 1907–8, and the following were elected honorary members in the section of science:—Profs. Ramon Y. Cajal, Madrid; W. Ostwald, Leipzig; E. C. Pickering, Cambridge (Mass.), U.S.A.; and H. Poincaré, Paris.

A Reuter message from Constantinople reports that considerable damage has been done to property at Bitlis by violent earthquake shocks on March 29.

On Tuesday, April 9, Prof. G. H. Bryan, F.R.S., will begin a course of two lectures at the Royal Institution on "Wings and Aëroplanes"; on Thursday, April 11, Prof. H. A. Miers, F.R.S., will commence a course of two lectures on "The Birth and Affinities of Crystals," and on Saturday, April 13, Prof. Silvanus P. Thompson, F.R.S., will begin a course of three lectures on "Studies in Magnetism" (the Tyndall lectures). The Friday evening discourse on April 12 will be delivered by Prof. A. H. Church, F.R.S., the subject being "Conservation of Historic Buildings and Frescoes," and on April 19 by Prof. C. S. Sherrington, F.R.S., on "Nerve as a Master of Muscle."

Mr. Andrew Carnegie has invited a large party of guests from England to attend the dedication of the new building of the Carnegie Institute at Pittsburg, Pennsylvania. A large contingent of the party left Liverpool on Wednesday last for New York by the White Star steamer *Baltic*, among them being Sir Robert Ball, Provost and Mrs. MacBeth, Prof. Rhys, Principal of Jesus College, Oxford, Mr. and Mrs. John Robertson, and Dr. John Ross.

The death is announced of Prof. J. K. Rees, formerly professor of astronomy in Columbia University, New York. Prof. Rees was for two years president of the New York Academy of Sciences, and for fourteen years secretary of the American Meteorological Society. His principal observational research was a study of the variation of terrestrial latitudes and the aberration of light, made in cooperation with the Royal Observatory, Naples. This work was continued from 1893 to 1900, and was the first application of the method of simultaneous observations at two stations situated on the same parallel of latitude, but separated widely in longitude. It was during Rees's professorship that Columbia University undertook the publication of Rutherford's series of star photographs. He also established the Columbia summer school of geodesy, and early recognised that practical field work in this subject is an indispensable adjunct in the training of civil engineers.

Among the scientific subjects for which prizes are offered by the Reale Istituto Lombardo, we note the following:—for the Cagnola prize, April, 1907, on the discovery of radio-activity and its influence on modern physical and chemical theories; for 1908, on the present state of metallography in relation to the physical properties of metals, particularly iron and steel, a general summary including some original results for the Fossati prize for 1907, on the so-called nuclei of origin and termination of the cranial nerves; for the Kramer prize for 1907, a discussion with certain practical applications of Guglielmini's hydraulic theories; for the Secco Comneno prize for 1907, a discovery relating to the virus of rabies; for 1911, on the physiological action of high-frequency currents. As in previous years, other prizes are offered for literary and commercial subjects and for subjects which are the same every year. For the present year the prize awards of the Reale Istituto Lombardo include a Cagnola prize of 100*l*. and medal of value 20*l*. to Dr. Augusto Moschini, of Pavia, for his essay on the pathology of the suprarenal capsules; a prize of 80*l*. to Dr. Guido Sala, of Pavia, and awards of 20*l*. to Prof. Domenico Lo Monaco and G. Pitò, of Rome, for essays on the anatomy of the visual centres of higher vertebrates under the Fossati foundation; and Kramer prizes of 80*l*. each to Ernesto Canalli, of Naples, and Mario Baroni, of Milan, for essays on the resistance of structures in cement.

A Reuter message states that Mr. Walter Wellman will again attempt to reach the North Pole by airship during the coming summer. The expedition steamer *Frithjof*, which is now at Trondhjem, is to be ready to leave Tromso, with the expedition on board, for Spitsbergen, on June 1. The party will consist of about thirty-five men, and will proceed at once to the expedition base at Dane's Island, established last year, where three men are now living. The balloon part of the airship *America* has been rebuilt in the ateliers of M. Mallet, Paris. The airship is 183 feet in length, with a greatest diameter of 52 feet. Its volume is 265,000 cubic feet, and when inflated the lifting force will be 19,500 lb. The car itself is 115 feet in length, of steel tubing, remarkably light and strong. The backbone of this car is a steel reservoir of equal length to contain 1200 gallons (6800 lb.) of petrol for the motors. The principal motor, a 60 to 70 horse-power Clement, works directly on two steel screws, 11·5 feet in diameter, placed at each side of the car. The proper speed of this airship is sixteen to eighteen statute miles per hour, and the fuel carried gives 150 hours of motoring at full speed; radius of action, more than 2250 miles, or nearly double the distance from Spitsbergen to the Pole and back again. All the mechanical part is being thoroughly tested by weeks of running, and at Spitsbergen trials will be made in the air of the completed ship before attempting the voyage to the Pole. It is intended to reach the expedition base at Spitsbergen the first week in June, to have trials of the airship in July, and to start for the Pole in the latter part of that month, or in the first half of August.

A correspondent sends us from Leal, Russia, some interesting particulars concerning the life and work of Dr. Jakob Hurt, the "keeper of Esthonian folk-lore," who died on December 31, 1906 (old style), to the great grief of all Esthonians. Dr. Hurt was born on July 10 (old style), 1839, at Wōru-maal (Werro district), Pōlwa parish. In 1859–63 he studied theology in the University of Tartu (now Jurjew), and after some years as lecturer in the gymnasium of that town was elected pastor to the parish church of Otepää, where he remained from 1872–80. As the Esthonian population in St. Petersburg grew, Dr. Hurt was called to minister in their native tongue in the Church of St. John, where the Esthonian congregation numbers now about 30,000 souls. He remained there from 1880–1901. His literary work was so great that he sacrificed his pastorage and devoted all his time to the native literature. In his early years he became keenly interested in this subject, and listened to old folks' chants and legends, which he recorded and published under the title of "Vana Kannel"—the Old Harp. These songs awakened a strong feeling among the people, and a collection began in 1888 which is now represented by 160 volumes of MSS. Only two volumes have appeared, and a third is in print as "Setukeste Laulud," or the songs of Setukesed. The whole national collection of Esthonian folk-lore now includes 60,000 records of superstition, 52,000 proverbs, 45,000 folk-songs, 40,000 enigmas, and 10,000 folk-tales. The death of a folklorist who could accumulate such a vast amount of material is a loss, not to the Esthonians alone, but also to the world at large. The Esthonians were almost a dead nation when Dr. F. R. Kreutzwald (1803–1882) published his "Kalewipoeg"—the Esthonian Homer's "Iliad"—which brought them to notice. The number of Esthonians is about one million. The limit of the Esthonian language extends from Reval (Tallinn) so far south as Walk in Livonia. There are many settlements of Esthonians in European Russia, Caucasia, Siberia, and in the United States, Canada, and other parts of the world. It will be a great loss to the world if the valuable material collected by Dr. Hurt is not preserved for future publication, and every effort should be made to secure this result. The English Folk-lore Society would probably help in this matter, and other societies might also do something. The sacrifice of the collection would be a misfortune to science as well as to the Esthonian nation.

Some observations which help to explain the frequent occurrence of anhydrite in beds of gypsum have been made by Mr. Louis C. Kemp, and are described in a note received from his father, Mr. W. I. Kemp. Mr. Kemp finds that anhydrite is readily formed from gypsum in solution in a steam boiler working at 60 lb. pressure per square inch. Having occasion to examine some of the boiler sludge, precipitated from the mine water which had been used in the boiler, he found the sludge to be almost pure anhydrite in fine crystals, and was confirmed in his observation by Dr. Gerald T. Moody, to whom part of the sample was sent.

Are there any instances of church bells having been cracked by sound waves produced in air by explosions or heavy firing? A note in the *West Sussex Gazette* of March 28 suggests that this happened recently in the village of Appledram, Sussex. Three volleys were fired by a naval party of twenty-four men over the grave of a seaman buried in the churchyard. On the evening of the same day one of the church bells, nearly six hundred years old, was found to be cracked. The firing party was only about a dozen yards from the belfry, and it is believed that the vibration caused by the three intense sound waves in rapid succession cracked the bell. It is well known that explosions and heavy firing have often broken windows, but we do not remember any case of a bell being damaged in this way. No windows were broken in the Appledram church, so apparently the effect was not due simply to compression waves. It would be interesting to know whether there are other cases of bells having been cracked in the way that glass globes are said to have been broken when set in violent vibration by sound waves.

On January 8 Prof. Willis L. Moore, chief of the U.S. Weather Bureau, was asked by a committee on agriculture of the House of Representatives at Washington certain questions in regard to rainfall and change of climate in the United States. The actual questions and answers have been reprinted in pamphlet form, and the information given by Prof. Moore is to the effect that the climate has in no way changed during recent years. With regard to the rainfall in Kansas, Nebraska, and other States, a table giving the means for thirty years, in periods of ten years, clearly shows that the aggregate amounts have neither increased nor diminished to any extent worthy of consideration. The first and last ten years were periods of fairly abundant rainfall, while in the middle ten years there was a deficiency. During the last few years there has certainly been an excess of rainfall in some districts, but Prof. Moore pointed out that as long a period of drought may be looked for later on. This very natural and valuable opinion appears to have given offence to some newspapers in Kansas as being injurious to the States in question, and likely to prevent the sale of land. Time will show that the attack they have made upon Prof. Moore is both unwise and unwarranted. His evidence is at least the outcome of knowledge obtained from a study of the best materials available to the Weather Bureau.

Interest in natural history is encouraged by a series of articles on the country month by month which is appearing in *Pearson's Magazine*. In addition to an illustrated article on the nature-story of April, with notes on the birds and flowers of the month and a calendar of the chief natural history events, the current number contains a contribution on the fertilisation of clover. This article gives an instructive account, with several striking photographs, of cross-fertilisation of white Dutch clover by bees, but the remark that clover plants are "wise in their day and generation" because their structure favours this process is, to say the least, misleading. Human attributes are implied even more definitely in the remark, "One cannot fail to admire the clover for its broad-mindedness in not only thinking of its own immediate well-being, but working and arranging for the future, that its progeny should be vigorous and healthy." It is a pity to use expressions of this kind when referring to the functions of flowers. A story entitled "A Message from the Moon" describes how an advertisement was projected by a parabolic reflector from the earth to the unilluminated part of the moon's surface. The idea is ingenious enough, but unfortunately the author and his illustrator make the usual mistakes about the crescent moon. The pictures show the advertisement on the dark part of an old crescent moon setting in a night scene, whereas such a crescent can, of course, only be seen shortly before sunrise. The author takes the same liberties with the moon's motions by describing the moon as rising at New York at night in crescent form with the advertisement visible upon it for "upwards of three hours and a half, that is, until the moon was well overhead." We advise the author and the artist to make a few observations of the rising and setting crescent moons, and they will soon learn that the positions in which they place our satellite can never be realised in nature.

We have to acknowledge the receipt of a copy of a "Catalogue of British Orthoptera, Neuroptera, and Trichoptera" (fifteen pages), by the late C. W. Dale, published by Messrs. Harwood, of Colchester.

Museum News (Brooklyn, N.Y.) for March records the bequest, by Mrs. C. H. Polhemus, to the museum of a number of pictures, bronzes, &c., of the estimated value of 8000*l*., together with a sum of money for the preservation and increase of the collection.

From the British Museum (Natural History) we have received a copy of a "List of British Seed-plants and Ferns," price 4*d*. The list, which has been drawn up by Dr. Rendle and Mr. Britten, excludes some introduced and all exterminated plants, as well as many of the phases of Rubus, Salix, &c., together with the Channel Islands flora. Plants which, although introduced, appear to have become naturalised, are indicated by italic type.

A copy of the second edition of the illustrated penny guide to the Hull Municipal Museum, compiled by Mr. T. Sheppard, the curator, has been received. The collections date from the year 1823, and include, among other valuable specimens, the type-skeleton of Sibbald's rorqual (*Balaenoptera sibbaldi*), prepared from a carcase stranded at Spurn in 1836, and named by Gray in 1847. A photograph of this skeleton forms one of the illustrations.

The histology and development of the divided eyes of certain insects form the subject of a paper by Mr. G. D. Shafer in the Proceedings of the Washington Academy of Sciences (vol. viii., pp. 459–486). The first part is devoted to the histology of the compound eyes of such forms as Sympetrum, the dragon-flies of the genus Anax, and the midges of the genus Callibætis, which are divided by a curved line into an upper light-coloured and a lower dark moiety; while in the second the author discusses the development of the large-facetted area of the eye of the first and third of these groups. In the case of the "turban-eye" of Callibætis, the formation of a superposition image on the proximal and an apposition image on the distal retinulæ enables the eye with the superposition image to see, although perhaps indistinctly, in dim light where the small-facetted, deeply pigmented eye would be useless. As these turban-eyes are restricted to the males of these may-flies, which seek the females during flight in the gloaming, their use is obvious.

"Meristic Homologies in Vertebrates" is the title of a thoughtful article by Mr. J. S. Kingsley in the February number of the *American Naturalist*. As one of the difficulties of the subject, the author points out that whereas mammals have twelve cranial nerves, in frogs and other ichthyopsidans the number is but ten. Consequently, the question arises whether the two additional nerves in the mammal are not due to the inclusion of two segments of the amphibian neck in the cranium of the former. If this be admitted, there is a strong *primâ facie* probability that the occipital condyles of the frog are not the homological representatives of those of the mammal. On the other hand, certain phenomena in annelids lead to the conclusion that segments, or somites, may be intercalated in various parts of the body by means of budding. If such a process exist in vertebrates, we could readily account for the two additional pairs of cranial nerves (representing as many segments) in the mammal as compared with the frog, without interfering with the homology of their condyles. So far, however, as the author is aware, no such budding zone is known in any vertebrate, and the hypothesis must consequently be regarded as merely of a tentative nature.

To the February number of the *Zoologist* Mr. T. Southwell contributes notes on Arctic whaling in 1906. The take of right-whales was very small, the total number being only seven (four from East Greenland, two from Davis Strait, and one from Hudson Strait), and it was only the high price of bone—about 2500*l.* per ton—that rendered the venture profitable. The most noteworthy feature is the capture of the four whales in East Greenland waters, where none had previously been taken since 1889. The capture suggests that there are more whales in these waters than is generally believed, their accessibility or otherwise being largely dependent upon the condition of the ice. The author directs special attention to the capture of four Atlantic right-whales by the Harris whalers, and likewise to the arrival of a cargo of " bone " from the same species (regarded a few years ago as nearly extinct) at New Bedford. In the March number of the same journal Mr. A. H. Paterson, of Yarmouth, gives some interesting particulars of the flocks of wildfowl and other birds which visited Norfolk at the time of the great snowfall of last Christmas. No less than about sixty swans were observed at Breydon, the majority of which appeared to be whoopers, although at least one is believed to have been of the Polish species, and pochards were vastly more numerous than for many years past.

Part iii. of the fifth volume of *Biometrika* was issued in February. The opening article is Mr. Raymond Pearl's " Biometrical Study of Conjugation in Paramecium," concerning which some correspondence took place in our columns last autumn (vol. lxxiv., pp. 465, 584, 608). The memoir is of great interest. It is found that conjugants are differentiated from non-conjugants not only in type, as was well known, but also in variability and in correlation. Conjugant types from various sources differ less *inter se* than non-conjugants. The dimensions of the two members of a conjugant pair are highly correlated, and it is shown that this is almost certainly due to the fact that the two must fit—to put the matter shortly—or else they do not adhere, and sooner or later separate. The significance of these important results is discussed with care in considerable detail. Mr. J. F. Tocher contributes an account of an anthropometrical survey of the insane in Scotland, carried out at the cost of the Henderson trust under his direction; stature and head dimensions were measured, and pigmentation noted, for more than 8000 cases in the Scotch asylums. The memoir is illustrated by maps, and the whole of the original data are reprinted, by permission of the Henderson trust, as a supplement. A short article by " Student " deals with a point of practical interest, viz. the fluctuations of sampling to be expected in counting with a hæmacytometer, and in similar operations. For example, in order to obtain pure cultures of a yeast, the fluid is diluted until it is estimated that every two drops contain on the average one cell; different flasks are then seeded with one drop each, and it is assumed that " the majority of those flasks which show growth are pure cultures." But the question arises, what actual proportion may be expected to be pure? The answer is, about 76 per cent.; 19 per cent. will have been seeded with two cells, and the remainder with three or more. As no references are given in the article, we may point out that the series used as a limit to the binomial when one of the chances is very small, is not novel; it was deduced by Poisson ("Recherches sur la Probabilité des Jugements," § 81, p. 206), and has been discussed in detail, with illustrations, by Bortkewitsch (" Das Gesetz der kleinen Zahlen," Leipzig, 1898).

An account of the mosses collected at Westende and Coxyde, in Belgium, on the dunes, sands, and reclaimed lands known as " polders," combined with a discussion of the physiological factors regulating their distribution, is contributed by Dr. J. Massart to the *Bulletin du Jardin botanique*, Brussels, vol. i., No. 6. About sixty species were collected, of which *Syntrichia* (*Tortula*) *ruraliformis* was the most characteristic and widely spread.

In the report of the Government laboratories at Manila for the year 1905–6, the superintendent, Mr. P. C. Freer, reviews the general lines of research carried out in the biological, chemical, and serum laboratories; he also formulates a plan for the establishment of a marine biological laboratory, and raises the question of founding a medical school in the Philippine Islands. Incidentally, Mr. Freer insists upon the necessity, that is not always rightly appreciated, for systematic botanical and entomological work, seeing that correct identification of plants or animals is an essential preliminary to the prosecution of investigation on economic products.

In *Petermann's Mittheilungen*, vol. iii., part ii., Prof. F. Höck presents the first part of a study of the phytogeographical boundaries and regions of northern Germany. Beginning with the vegetation of East Prussia, the author states that the eastern boundary of the beech and the western limit of certain plants of the moors and swamps lie in this province, so that it may be regarded as a transition district between Russia and north-western Germany. The botanical region of north-western Germany is contrasted with the adjoining botanical provinces of lower Saxony, Schleswig-Holstein, and the Netherlands, all the latter containing various North Atlantic species that are absent in north-western Germany.

Under the title of the " Century Plant," Prof. W. Trelease contributes an article on the more important species of Agave to the March number of the *Popular Science Monthly*, New York. The chief value of many of the Agaves grown in Mexico lies in the fermented liquors prepared from the sap. In the plains of Apam, south of the City of Mexico, the sap is collected from extensive plantations of *Agave atrovirens* to make " pulque." " Mezcal " is a liquor obtained by distillation in another part of Mexico from *Agave Tequilana* and other species; " sotol " is the product of plants of the liliaceous genus Dasylirion. Reference is also made to the varieties that furnish sisal-hemp and other fibres.

BOTANICAL survey work concerned with the mapping of the vegetation of a given area according to a plan which is the outcome of a method suggested by Prof. C. Flahault, of Montpellier, has attracted a small but energetic band of workers in the United Kingdom. The latest survey prepared by Mr. C. E. Moss, dealing with the distribution of vegetation in Somerset, was published in the *Geographical Journal* (October, 1906). In the lowland areas Mr. Moss traces the transition from dunes fixed by sea-couch grass, *Agropyron junceum*, and marram-grass, *Ammophila arundinacea*, to dune ponds and dune pastures, and so to maritime farmlands. In another sequence of associations, the salt marsh, at first settled with Salicornia, is converted into land suitable for growing osiers and tree willows. Similarly, typical series of formations are described for the upland areas, which are as markedly characteristic and easily recognised, so that the present paper provides an admirable introduction to anyone taking up the subject.

MESSRS. CARL ZEISS, of Jena, have forwarded a copy of their price-list relating to large projection apparatus. This list contains a brief reference to everything necessary for the projection of microscopic objects, transparencies placed horizontally or vertically, and opaque objects. Some general information is also given as to selection of the optical equipment for special purposes.

IN the Journal of the Royal Microscopical Society, Mr. J. W. Gordon describes a top stop for the microscope. This is placed in the Ramsden circle of the instrument, its effect being to cut off the central part of every beam of light. In this way the advantages of a wide aperture are preserved, and the definition is improved, as is well shown by the photographs illustrating the paper. This improvement is attributed to the fact that in an unstopped beam the central and marginal parts do not exactly form the same image, and the confusion thus caused is obviated by the stop. To cut off the marginal rays would be merely equivalent to using a narrower aperture.

RECENT progress in the industry of perfumery and essential oils is ably summarised in a report by Messrs. A. Haller and H. Gault in the *Bulletin de la Société d'Encouragement* (vol. cix., No. 2). Commercial statistics show that as a result of theoretical chemical researches there has been equal progress in the manufacture of natural essences and in the preparation of artificial perfumes.

THE Engineering Standards Committee has issued a second report (No. 26; London: Crosby Lockwood and Son, price 10*s.* 6*d.*) of the locomotive committee on standard locomotives for Indian railways. Four additional types of locomotive have been included at the request of the Indian Railway Board, and at the request of the Secretary of State for India the locomotive committee has formed itself into a permanent advisory body.

AN address on the duration of the coal reserves of the United States, delivered by Mr. Marius R. Campbell to the National Geographic Society at Washington, is published in the *National Geographic Magazine* (vol. xviii., No. 2). He enumerates the coal areas of the various States, and shows that, while Pennsylvania produces the most coal, Montana has the largest coalfields. The total amount of coal in the United States, exclusive of Alaska, is estimated at 2,200,000 million tons. If the rate of consumption of 1905 were maintained indefinitely without change, this would last for 4000 years, but if the constantly increasing rate which has marked the consumption during the past ninety years be maintained, the coal supply will practically be exhausted within a hundred years.

MESSRS. F. VIEWEG AND SON have just published (pp. 417, price 12 marks) a fourth edition, revised and enlarged, of Prof. Albert Ladenburg's well-known "Vorträge über die Entwicklungsgeschichte der Chemie von Lavoisier bis zum Gegenwart," the first edition of which appeared so long ago as 1869. The main value of the work lies in the careful historical treatment of the progress of chemistry up to the time of the introduction of the conception of valency. To bring the account up to date, however, additional chapters have been written for the new edition dealing with recent advances in physical chemistry, and including the theories of mass action, heterogeneous equilibrium, tautomerism, stereochemistry, and solution; a review is also given of recent discoveries in organic chemistry. A special feature of this history is the very large number of references given to the original papers.

A THIRD edition of Prof. H. Röttger's "Lehrbuch der Nahrungsmittel-Chemie" has just been issued by the firm of J. A. Barth, of Leipzig (pp. xiv+901, price 16 marks paper covers, 17 marks bound). This work, probably for its completeness the most concise treatise on the chemistry of foods yet written, has gained in Germany a very high reputation, the second edition having been exhausted in a little more than three years. To the new edition a number of tables and an index of authors' names have been added, and a very complete set of references is given to the latest papers in all departments of the subject. Third editions have also been published by F. Tempsky, of Vienna, of Franz von Hemmelmayr's "Lehrbuch der anorganischen Chemie" and "Lehrbuch der organischen Chemie" (pp. 237, price 3 krone, and pp. 150, price 2·30 krone, respectively); these books are designed for use in the fifth and sixth classes of the Austrian Realschulen, and are of a purely elementary character.

SINCE the list of forthcoming scientific books appeared in NATURE of March 14, Messrs. Swan Sonnenschein and Co., Ltd., have announced that they have in preparation:—"The History and Ethnography of Africa South of the Zambezi, from the Settlement of the Portuguese at Sofala in September, 1505, to the Conquest of the Cape Colony by Great Britain in September, 1795," by G. M. Theal; "Thought and Things: a Study of the Development and Meaning of Thought or Genetic Logic," by Prof. J. M. Baldwin, 3 vols., vol. ii., "Experimental Logic," vol. iii., "Real Logic"; "The History of Philosophy," based on the work of Dr. J. E. Erdmann, fifth German edition, revised by Dr. W. B. Erdmann, edited by W. S. Hough; "Lectures in Humanism," by Prof. J. S. Mackenzie; "Mental Pathology and its Relation to Normal Psychology,' by Prof. Storring, translated by Prof. T. Loveday; "Physiological Psychology," by Prof. W. Wundt, a translation of the fifth and wholly re-written German edition by Prof. E. B. Titchener, vol. ii.; "The Student's Text-book of Zoology," by A. Sedgwick, F.R.S., vol. iii., completing the work; and new editions of "Elementary Text-book of Practical Botany for the Botanical Laboratory and Private Student," by Prof. E. Strasburger, English edition by Prof. W. Hillhouse; and "Handbook of Mosses," by J. E. Bagnall.